REMARKS

Claims 1-12 are pending.

Claims 1-7 and 9-12 are amended.

The amendments to Claims 1-7 and 9-12 serve to improve readability and place the claim language in better conformance with U.S. patent practice.

No new matter is believed to be added upon entry of the amendment.

Upon entry of the amendment, Claims 1-12 will be active.

Applicants thank the Examiner Marcheschi for conducting the kind and courtesy discussion with Applicants' representative, Daniel R. Evans, on March 17, 2005.

During the discussion, Applicants' representative explained to the Examiner that none of the references described or suggested an abrasive for polishing glass, as claimed in Claim 4.

Furthermore, Applicants' representative explained to the Examiner that polishing glass with an abrasive having a silica absorption rate (η) on the abrasive grains, which is at most 50%, is a critical feature of a polishing method (Claim 3), and the claimed abrasive (Claim 4).

An aspect of the present invention is directed to a method for evaluating abrasive grains, and thereby selecting the abrasive grains having a silica absorption rate (η) on the abrasive grains of at most 50%; in order to realize a polishing method that employs abrasive grains having excellent durability and polishing rates. These aspects are important because abrasive grains employed in a glass polishing process are typically recycled; consequently, abrasive grains having excellent durability serves to reduce the overall maintenance of a polishing process, and can effectively reduce the overall costs of the process.

The inventors of the present invention have determined that problems can arise in a polishing process that employs abrasive grains if the silica absorption rate is too high. The Examiner's attention is directed to the text on page 7 of the present specification which describes a proposed mechanistic model pertaining to the importance of absorption of silica to abrasive grain particles and the resultant polymerization of silica as applied to a polishing method. In particular, when abrasive grain particles have a high absorption rate, absorbed silica, under appropriate conditions, undergoes polymerization. The resultant polymerized silica can effectively serve as a binder for abrasive grains, and effectively reduce the durability of the abrasive grains (see page 8, lines 13-26).

As noted in the present specification beginning on page 9, line 3, methods have been proposed that are directed at solving this problem. For example, the disclosure of JP-A-50-13405 proposes to add a calcium secondary phosphate or the like to the abrasive grains, so that the abrasive grains will be readily dispersed. Additionally, the disclosure of JP-A-6-330025 describes adding an amount of cerium fluoride and a small amount of calcium compound are added to an abrasive comprising as the main component of rare earth oxide. While each of the above-mentioned methods is effective to some extent, these methods in and of themselves add new complications that are somewhat undesirable.

The present invention is directed at providing a solution to these problems, and it is believed that the process as described in Claim 1 and the abrasive for polishing glass as described in Claim 4 are both novel and unobvious over the references of record.

The rejection of Claims 4-8 under 35 U.S.C. § 102(b), or in the alternative under 35 U.S.C. § 103(a), over the disclosure of WO 02/062917 (hereinafter WO '917), based on the disclosure of US Patent No. 6,843,816 (hereinafter US '816) is respectfully traversed.

The rejection of Claims 10-12 under 35 U.S.C. § 103(a) over WO '917, as evidenced by US '816, is respectfully traversed.

The rejection of Claims 4-5 and 10-11 under 35 U.S.C. § 102(b), or in the alternative under 35 U.S.C. § 103(a), over the disclosure of EP 1243633 (hereinafter EP '633) is respectfully traversed.

The rejection of Claims 4 and 10 under 35 U.S.C. § 102(b), or in the alternative under 35 U.S.C. § 103(a), over the disclosure of US Patent No. 6,358,853 (hereinafter US '853) is respectfully traversed.

At the outset, it is noted that none of the references describe of suggest any abrasive which comprises as the main component a rare earth oxide comprising cerium oxide having a silica absorption rate on the abrasive grains which is at most 50%.

US '816 describes a cerium-based abrasive and a production method of a cerium-based abrasive for a polishing method. The abrasive grains described in US '816 are obtained from raw materials comprising bastnasite, rare earth oxide, or cerium oxide (col. 9, line 45 – col. 12, line 30, Table 1). The raw materials may or may not be treated with fluorine (col. 9, lines 49-60), but are all roasted at a temperature that ranges from 800°C to 1,100°C for 3 hours (col. 9, lines 60-63). Furthermore, the abrasive grains in US '816 are selected based on L*a*b* color system, which is described in the text in col. 11, lines 41-54.

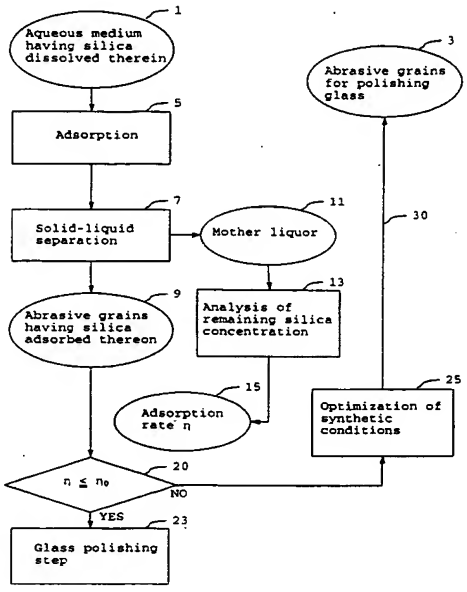
There is no description or suggestion to select abrasive grains comprising as the main component a rare earth oxide comprising cerium oxide having a silica absorption rate (η) on the abrasive grains which is at most 50%.

This is in contrast to that which is claimed in Claim 4 and claims dependent thereon.

In order to better appreciate the criticality of the limitation of the abrasive grains having a silica absorption rate that is at most 50%, the Examiner's attention is directed to

Figure 1, which for convenience appears below; and the text of the present specification beginning on page 20, line 14 and ending on page 21, line 27.

Fig. 1



As can be seen from the figure, the method of evaluating abrasive grains begins by adding abrasive grains to an aqueous medium having silica dissolved therein **1**. After some period of time, absorption occurs **5**, which is followed by solid-liquid separation **7**. The mother liquor **11** obtained from **7** is analyzed by measuring the silica concentration **13**. An absorption rate η is than determined. If $\eta \leq \eta_o$, in which η_o is 50% **20**, then the abrasive grains are used for a glass polishing step. If $\eta \leq \eta_o$, then synthetic conditions are optimized **25** to obtain abrasive grain particles that satisfy this constraint. Applicants note that the silica absorption rate of 50% is a critical value. Applicants also note that conventional abrasive fine grains that comprise as the main component a rare earth oxide containing cerium oxide have a silica absorption rate of 58.3%.

The Examiner's attention is directed to the test results that begin on page 53 of the present specification and end on page 87, and are summarized in the following Table.

Ex. No.	η (%)	CDG[a] (mass%)	PR[b] (μm/hr)
1	28.1%	0.135-1.085	10.83-9.80
2	39.4	0.134-0.967	10.73-8.34
3	17.3	0.136-1.150	10.87-11.28
4	23.0	0.136-1.146	10.85-11.24
5	25.2	0.134-1.050	10.75-9.65
6	36.2	0.134-1.036	10.73-9.51
7	30.1	0.135-1.043	10.76-9.63
8	27.1	0.137-1.127	10.97-10.00
9	25.2	0.136-1.160	10.89-11.41
10	40.2	0.136-1.176	10.90-11.73
11	49.8	0.136-1.161	10.85-11.39
CE1	58.3	0.125-0.735	10.02-5.02

[a]Concentration of Dissolved Glass. [b]Polishing Rate.

Important parameters to consider for the following discussion are silica adsorption rate (η); concentration of dissolved glass in the slurry (CDG), as expressed in terms of mass%, and the polishing rate, expressed in terms of μm/hour. In each of the Examples, the Table provides the measured value of η and a range for both the CDG and PR. For instance, in each of the examples the first value of the reported range of the CDG and PR represents the value after one hour, and the second value represents the value after eight hours of operation.

The data obtained from Examples 1-11 show that the CDG increases with time, and that the PR undergoes very little change over this time period. There are two aspects that the Examiner is asked to recognize. The first, when the abrasive grains used in the polishing method have a silica absorption rate that is at most 50% the polishing rate of the abrasive grains undergoes very little decrease with time. Even when the abrasive grains have a silica absorption rate of 49.8%, the PR value over an 8 hr period is substantially the same. The data provided for the abrasive grains described in Comparative Example 1 (see page 83, line 9 -

page 84, line 25 and page 21, lines 21-27) show that conventional abrasive grains show different CDG and PR values, when compared to examples that fall within the scope the claimed invention. In addition, the 8 hr value of the CDG is lower because the silica is adsorbed on the particles, rather than being dissolved in the slurry. Also the PR decreases by a factor of two over an 8 hr time period. Which means that the abrasive grains have a shorter longevity and during a polishing process must be replenished at a greater frequency when compared to abrasive grains having an η of at most 50%.

None of these references describe this aspect. Not only do they not describe this aspect, they do not suggest the criticality of having abrasive grains comprising, as a main component, cerium oxide having a silica absorption rate of at most 50%.

US '816 does not describe or suggest this feature. The only evaluation test described in US '816 is a colorimetric test.

Furthermore, the disclosure of US '853 does not describe or suggest this aspect. US '853 describes taking a convention cerium oxide material, adding it to silica particles in the presence of water and polishing (see col. 3, lines 23-45); but does not describe or suggest the limitation of the abrasive for polishing glass as presently claimed in Claim 4.

What is true of the disclosures of US '816 and US '853 is especially true for the disclosure of EP '633. EP '633 does not describe or suggest the evaluating test as claimed in Claim 1 which is used to obtain abrasive grain particles comprising as the main component a rare earth oxide comprising cerium oxide which has a silica absorption rate on the abrasive grains which is at most 50%.

Consequently, it is believed that Claims 4-8 and 10-12 are both novel and unobvious over the disclosures of US '816, US '853, and EP '633.

It is kindly requested that the Examiner acknowledge the same and withdraw these rejections.

The rejection of Claims 1-12 under 35 U.S.C. § 112, second paragraph, is obviated by amendment. Claims 1-12, where appropriate, have been amended so that the claim language better conforms with US patent practice. New Claims 13-14 are also believed to be free of indefinite language. It is kindly requested that the Examiner withdraw this rejection.

In view of the amendments to the claims and the comments contained herewith, it is believed that the present application is in a condition for allowance.

Should the Examiner deem that a personal or telephonic interview would be helpful in advancing this application toward allowance, he is encouraged to contact Applicants' undersigned representative at the below-listed telephone number.

Respectfully submitted,

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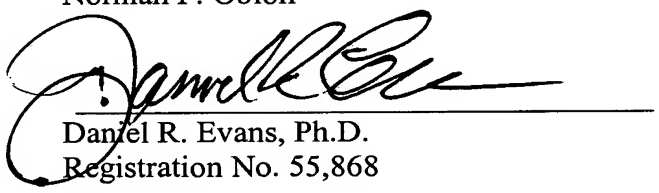

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